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•	TRAUS				•									
	<110>	Kottwitz, Breves, F Maurer, F	Roland											
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410						

415

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Thr Ser Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu 50 55 60

Gly Glu Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys 65 70 75 80

Gly Glu Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn 85 90 95

Val Tyr Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr 100 105

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Ile Ser Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro 130 135 140

Gly Arg Gly Ser Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe 145 150 155 160Page 3

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Page 6

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Gly Glu His Arg 130	ı Ile Lys Ala 135	Trp Thr	His Phe	His Phe 140	Pro Gly	Arg
Gly Ser Thr Tyr 145	Ser Asp Phe	Lys Trp	His Trp 155	Tyr His	Phe Asp	Gly 160
Thr Asp Trp Asp	Glu Ser Arg	Lys Leu	Asn Arg Page 11		Lys Phe	Gln

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Asp Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly 460 Trp Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln Arg <210> <211><212> 1446 DNA <213> Artificial <220> <223> Fusion of Alpha-Amylase-Gene von B. licheniformis and B. amyloliquefaciens (AL76) <220> <221> CDS <222> (1)..(1443)gta aat ggc acg ctg atg cag tat ttt gaa tgg tat acg ccg aac gac Val Asn Gly Thr Leu Met Gln Tyr Phe Glu Trp Tyr Thr Pro Asn Asp 1 10 15 48 ggc cag cat tgg aaa cga ttg cag aat gat gcg gaa cat tta tcg gat Gly Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp 20 25 3096 atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga ttg agc Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser 35 40 45 144 caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta gga gaa Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu 50 55 60 192 ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa gga gag Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu 65 70 75 80 240 ctg caa tct gcg atc aaa agt ctt cat tcc cgc gac att aac gtt tac Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr 85 90 95 288 ggg gat gtg gtc atc aac cac aaa ggc ggc gct gat gcg acc gaa gat Gly Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr Glu Asp 100 105 110336 gta acc gcg gtt gaa gtc gat ccc gct gac cgc aac cgc gta att tca Val Thr Ala Val Glu Val Asp Pro Ala Asp Arg Asn Arg Val Ile Ser 384 120 gga gaa cac cga att aaa gcc tgg aca cat ttt cat ttt ccg ggg cgc Gly Glu His Arg Ile Lys Ala Trp Thr His Phe His Phe Pro Gly Arg 432

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Page 13

480

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Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu 65 70 75 80

Leu Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr $85 \hspace{1cm} 90 \hspace{1cm} 95$

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Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu 50 60

Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu 65 70 75 80

Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr 85 90 95

Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp 100 105 110

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Page 20

Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr Trp His 435 440 445	
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gaa Glu 465	ggc Gly	tgg Trp	gga Gly	gag Glu	ttt Phe 470	cac His	gta Val	aac Asn	ggc Gly	ggg Gly 475	tcg Ser	gtt Val	tca Ser	att Ile	tat Tyr 480	1440
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Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser 35 40 45

Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu 50 60

Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu 65 70 75 80

Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr 85 90 95

Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp 100 105 110

Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser 115 120 125

Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro Gly Arg 130 135 140

Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly 155 160 Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg 165 170 175 Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn 180 185 190 Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val 195 200 205 Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser 210 215 220 Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe 225 230 235 240 Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met 245 250 255 Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn 260 270 Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu 275 280 285 His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Tyr Asp Met 290 295 300 Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala 305 310 315 320 Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu 325 330 335 Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu 340 345 350 Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly 355 Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile 370 380 Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His 385 390 395 400 Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp 405 410 415

								11611		0.5.		~ .					
Ser	Ser	val	Ala 420	Asn	Ser	Glу	Leu	Ala 425	Ala	Leu	Ile	Thr	Asp 430	Gly	Pro		
Gly	Gly	Ala 435	Lys	Arg	Met	Туr	Val 440		Arg	Gln	Asn	Ala 445	Gly	Glu	Thr		
Trp	ніs 450	Asp	Ile	Thr	Glу	Asn 455	Arg	Ser	G]u	Pro	Val 460	۷a٦	Ile	Asn	Ser		
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gag Glu	gaa Glu 130	tat Tyr	caa Gln	atc Ile	aaa Lys	gcg Ala 135	tgg Trp	acg	gat	ttt	25.t cgt Arg 140	ttt	ccg Pro	ggc Gly	cgt Arg	432
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cat His	ttc Phe 290	aat Asn	tta Leu	cag Gln	gcg Ala	gct Ala 295	tcc Ser	tca Ser	caa Gln	gga Gly	ggc Gly 300	gga Gly	tat Tyr	gat Asp	atg Met	912
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gat	tat	att	gac	cac	cca	gat	ata	HENI atc).ST			gaa	ggt	aac	1248
Ăsp	Tyr	Ile	Ăsp	Ніs 405	Pro	Åsp	val	Ile	61y 410	Trp	Thr	Arg	ĞÎü	61y 415	Asp	
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Gln Ala Asp Val Gly Tyr Gly Ala Tyr Asp Leu Tyr Asp Leu Gly Glu 50 55 60

Phe His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu 65 70 75 80

Leu Gln Ser Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln Val Tyr 85 90 95

Gly Asp Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr Glu Asp 100 105 110

Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Thr Ser 115 120 125

Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe_Arg Phe Pro Gly Arg

135

Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe Asp Gly 155 160 Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys Phe Arg 165 170 175 Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn Gly Asn 180 185 190 Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro Asp Val 195 200 205Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu Leu Ser 210 215 220 Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe Ser Phe 225 230 235 240 Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys Glu Met 245 250 255 Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu Glu Asn 260 265 270 Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val Pro Leu 275 280 285 His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Tyr Asp Met 290 295 300 Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu Lys Ala 305 310 315 320 Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu 325 330 335 Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu 340 350 Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly 355 360 365 Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp Asn Ile 370 380 Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His 385 390 395 400 Asp Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp

Ser Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro 420 425 430	
Gly Gly Ser Lys Arg Met Tyr Ala Gly Leu Lys Asn Ala Gly Glu Thr 435 440 445	
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tcg gat atc gga atc act gcc gtc tgg att cct ccc gca tac aaa gga Ser Asp Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly 35 40 45	144
ttg agc caa tcc gat aac gga tac gga cct tat gat ttg tat gat tta Leu Ser Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu 50 55 60	192
gga gaa ttc cag caa aaa ggg acg gtc aga acg aaa tac ggc aca aaa Gly Glu Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys 65 70 75 80	240
tca gag ctt caa gat gcg atc ggc tca ctg cat tcc cgg aac gtc caa Ser Glu Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln 85 90 95	288
gta tac gga gat gtg gtt ttg aat cat aag gct ggt gct gat gca aca Val Tyr Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr 100 105 110	336
gaa gat gta act gcc gtc gaa gtc aat ccg gcc aat aga aat cag gaa Glu Asp Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Page 29	384

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aat t Asn S 465	tcg Ser	gaa Glu	ggc Gly	tgg Trp	gga Gly 470	gag Glu	ttt Phe	cac His	gta Val	aac Asn 475	ggc Gly	ggg Gly	tcg Ser	gtt Val	tca Ser 480	1440
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Thr Ser Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro 130 140 Gly Arg Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe 145 150 155 160 Asp Gly Ala Asp Trp Asp Glu Ser Arg Lys Ile Ser Arg Ile Phe Lys 165 170 175 Phe Arg Gly Glu Gly Lys Ala Trp Asp Trp Glu Val Ser Ser Glu Asn 180 185 190 Gly Asn Tyr Asp Tyr Leu Met Tyr Ala Asp Val Asp Tyr Asp His Pro 195 200 205 Asp Val Val Ala Glu Thr Lys Lys Trp Gly Ile Trp Tyr Ala Asn Glu 210 215 220 Leu Ser Leu Asp Gly Phe Arg Ile Asp Ala Ala Lys His Ile Lys Phe 225 230 235 240 Ser Phe Leu Arg Asp Trp Val Gln Ala Val Arg Gln Ala Thr Gly Lys 245 250 255 Glu Met Phe Thr Val Ala Glu Tyr Trp Gln Asn Asn Ala Gly Lys Leu 260 265 270 Glu Asn Tyr Leu Asn Lys Thr Ser Phe Asn Gln Ser Val Phe Asp Val 275 280 285 Pro Leu His Phe Asn Leu Gln Ala Ala Ser Ser Gln Gly Gly Tyr 290 295 300 Asp Met Arg Arg Leu Leu Asp Gly Thr Val Val Ser Arg His Pro Glu 305 310 315 320 Lys Ala Val Thr Phe Val Glu Asn His Asp Thr Gln Pro Gly Gln Ser 325 330 335 Leu Glu Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe 340 345 350 Ile Leu Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met 355 360 365 Tyr Gly Thr Lys Gly Thr Ser Pro Lys Glu Ile Pro Ser Leu Lys Asp 370 380 Asn Ile Glu Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro 385 390 395 400

Gln	His	Asp	Tyr	11e 405	Asp	His	Pro	Asp	Val 410	Ile	Gly	Trp	Thr	Arg 415	Glu	
Gly	Asp	Ser	Ser 420	Ala	Ala	Lys	Ser	G]y 425	Leu	Ala	Ala	Leu	Ile 430	Thr	Asp	
Gly	Pro	Gly 435	Gly	Ala	Lys	Arg	Met 440	Туг	Val	Gly	Arg	Gln 445	Asn	Ala	Gly	
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tcg Ser	gat Asp	atc Ile 35	gga Gly	atc Ile	act Thr	gcc Ala	gtc Val 40	tgg Trp	att Ile	cct Pro	ccc Pro	gca Ala 45	tac Tyr	aaa Lys	gga Gly	144
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ggt Gly	ggg Gly	gca Ala 435	aag Lys	cga Arg	atg Met	tat Tyr	gtc Val 440	ggc Gly	cgg Arg	caa Gln	aac Asn	gcc Ala 445	ggt Gly	gag Glu	aca Thr	1344
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Ser Asp Ile Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly 35 40 45

Leu Ser Gln Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu 50 60

Gly Glu Phe Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys 65 70 75 80

Ser Glu Leu Gln Asp Ala Ile Gly Ser Leu His Ser Arg Asn Val Gln 85 90 95

Val Tyr Gly Asp Val Val Leu Asn His Lys Ala Gly Ala Asp Ala Thr 100 105 110

Glu Asp Val Thr Ala Val Glu Val Asn Pro Ala Asn Arg Asn Gln Glu Page 35

Thr Ser Glu Glu Tyr Gln Ile Lys Ala Trp Thr Asp Phe Arg Phe Pro 130 140 Gly Arg Gly Asn Thr Tyr Ser Asp Phe Lys Trp His Trp Tyr His Phe 145 150 155 160 Asp Gly Thr Asp Trp Asp Glu Ser Arg Lys Leu Asn Arg Ile Tyr Lys 165 170 175Phe Gln Gly Lys Ala Trp Asp Trp Glu Val Ser Asn Glu Asn Gly Asn 180 185 190 Tyr Asp Tyr Leu Met Tyr Ala Asp Ile Asp Tyr Asp His Pro Asp Val 195 200 205Ala Ala Glu Ile Lys Arg Trp Gly Thr Trp Tyr Ala Asn Glu Leu Gln 210 215 Leu Asp Gly Phe Arg Leu Asp Ala Val Lys His Ile Lys Phe Ser Phe 225 230 235 240 Leu Arg Asp Trp Val Asn His Val Arg Glu Lys Thr Gly Lys Glu Met 245 250 255 Phe Thr Val Ala Glu Tyr Trp Gln Asn Asp Leu Gly Ala Leu Glu Asn 260 265 270 Tyr Leu Asn Lys Thr Asn Phe Asn His Ser Val Phe Asp Val Pro Leu 275 280 285 His Tyr Gln Phe His Ala Ala Ser Thr Gln Gly Gly Tyr Asp Met 290 295 300 Arg Lys Leu Leu Asn Ser Thr Val Val Ser Lys His Pro Leu Lys Ala 315 320 Val Thr Phe Val Asp Asn His Asp Thr Gln Pro Gly Gln Ser Leu Glu 325 330 335 Ser Thr Val Gln Thr Trp Phe Lys Pro Leu Ala Tyr Ala Phe Ile Leu 340 345 350 Thr Arg Glu Ser Gly Tyr Pro Gln Val Phe Tyr Gly Asp Met Tyr Gly 355 360 365 Thr Lys Gly Asp Ser Gln Arg Glu Ile Pro Ala Leu Lys His Lys Ile 370 380 Glu Pro Ile Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His

385

Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp 405 410 415

Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro 420 425 430

Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Glu Thr 435 440 445

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Gln His Trp Lys Arg Leu Gln Asn Asp Ser Ala Tyr Leu Ala Glu His 50 60

Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Thr Ser Gln 65 70 75 80

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His Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Gly Glu Leu 100 105 110

Gln Ser Ala Ile Lys Ser Leu His Ser Arg Asp Ile Asn Val Tyr Gly
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Asp Val Val Ile Asn His Lys Gly Gly Ala Asp Ala Thr Glu Asp Val 130 135 140 Page 37

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Leu Lys Ala Arg Lys Gln Tyr Ala Tyr Gly Ala Gln His Asp Tyr Phe Asp His His Asp Ile Val Gly Trp Thr Arg Glu Gly Asp Ser Ser Val Ala Asn Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly Gly Ala Lys Arg Met Tyr Val Gly Arg Gln Asn Ala Gly Gly Glu Thr Trp His Asp 480

Ile Thr Gly Asn Arg Ser Glu Pro Val Val Ile Asn Ser Glu Gly Trp 485

Gly Glu Phe His Val Asn Gly Gly Ser Val Ser Ile Tyr Val Gln Arg Sly Gly Arg Sly Ser Val Ser Ile Tyr Val Gln Arg Sly Gly Gly Arg Sly Trp 485

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Gln His Trp Lys Arg Leu Gln Asn Asp Ala Glu His Leu Ser Asp Ile 50 55 60

Gly Ile Thr Ala Val Trp Ile Pro Pro Ala Tyr Lys Gly Leu Ser Gln 65 70 75 80

Ser Asp Asn Gly Tyr Gly Pro Tyr Asp Leu Tyr Asp Leu Gly Glu Phe 85 90 95

Gln Gln Lys Gly Thr Val Arg Thr Lys Tyr Gly Thr Lys Ser Glu Leu 100 105 110

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Pro Ile Leu Lys Ala Arg Lys Glu Tyr Ala Tyr Gly Pro Gln His Asp 420 425 430

Tyr Ile Asp His Pro Asp Val Ile Gly Trp Thr Arg Glu Gly Asp Ser 435 440 445

Ser Ala Ala Lys Ser Gly Leu Ala Ala Leu Ile Thr Asp Gly Pro Gly 450 460

Gly Ser Lys Arg Met Tyr Ala Gly Leu Lys Asn Ala Gly Glu Thr Trp 465 470 475 480

Tyr Asp Ile Thr Gly Asn Arg Ser Asp Thr Val Lys Ile Gly Ser Asp 485 490 495

Gly Trp Gly Glu Phe His Val Asn Asp Gly Ser Val Ser Ile Tyr Val
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Gln Lys